ACETABULAR CUP AND REAMER ASSEMBLY AND ASSOCIATED METHOD FOR SECURING THE CUP TO AN ACETABULUM

Technical Field of the Invention

The present invention relates generally to an acetabular component, and more particularly to an acetabular cup and reamer assembly and associated method for securing the cup to an acetabulum.

Background of the Invention

During the lifetime of a patient, it may be necessary to perform a hip replacement procedure on the patient as a result of, for example, disease or trauma. The hip replacement procedure may involve a total hip replacement or a partial hip replacement. In a total hip replacement procedure, a femoral component having a head portion is utilized to replace the natural head portion of the thigh bone or femur. The femoral component typically has an elongated intramedullary stem which is utilized to secure the femoral component to the patient's femur. In such a

total hip replacement procedure, the natural bearing surface of the acetabulum is resurfaced or otherwise replaced with a cup-shaped acetabular component which provides a bearing surface for the head portion of the femoral component.

Acetabular cups may be secured to the acetabulum in a number of different manners. For example, acetabular cups may be secured to the acetabulum by the use of bone cement. However, recent studies have speculated that it may be desirable to secure artificial components to natural bone structures without the use of bone cement. Hence, a number of press fit acetabular cups have been designed for securement to the acetabulum without the use of bone cement.

In either case (i.e. cemented or cementless), the acetabulum is first reamed by the surgeon in order to create a cavity into which the acetabular cup is secured by the use of a surgical tool known as a reamer. It is often difficult for the surgeon to properly match the size of the reamer to the desired acetabular cup size.

Although press fit acetabular cups have heretofore been referred to as being "generally hemispherical" in shape, such heretofore designed cups, in reality, are sub-hemispherical in shape. In particular, as shown in the prior art drawing of FIG. 7, a heretofore designed acetabular cup 100 has an apex or dome 102 at a proximal end 104 thereof along with an annular rim 106 at a distal end 108 thereof. In between the dome 102

and the annular rim 106, the prior art acetabular cup 100 has a sidewall 108 which has a convex proximal surface and a concave distal surface.

However, as shown in FIG. 7, the configuration of the prior art acetabular cup 100 is sub-hemispherical. In particular, a "true" hemisphere 114 is shown in FIG. 7 as a phantom line overlay. As can be seen, a distal face 116 of the annular rim 106 does not, in fact, lie along the 180° surface (or loosely, the equator 118) of the hemisphere 114, but rather is recessed away from the equator 118 by a relatively significant distance X. In fact, it is not uncommon for prior art cup designs to be recessed from the equator 118 of the cup by as much as 4-5 millimeters (i.e. X=4-5 mm).

Such a configuration has a number of drawbacks associated therewith. For example, such a large recess distance X (i.e. 4-5 mm) renders it difficult for the surgeon to ream a properly sized cavity in the acetabulum. In particular, the cutting head of heretofore designed reamers are typically configured as relatively true hemispheres. Hence, when a surgeon reams the patient's acetabulum, the surgeon has to "estimate" the approximate depth of the reamed recess. More specifically, if the surgeon reams all the way to the 180° surface or "equator" of the reamer, the annular rim 106 of the acetabular cup 100 will be recessed in the reamed cavity. Conversely, if the surgeon does not ream deeply enough (i.e. "under reams"), the acetabular cup 100 will not be fully seated in the reamed cavity of the acetabulum. In light of the fact that

surgeons occasionally select a reamer that is slightly smaller in size than the acetabular cup to be implanted, under reaming may also disadvantageously lead to bone fracture of the acetabulum since excessive force is often utilized to insert the cup into the undersized (i.e. under reamed) cavity. Some of the early bone cemented cups did not suffer from this problem by being configured more closely as "true" hemispheres. However, as indicated above, such cups undesirably required the use of bone cement during implantation thereof.

Another drawback associated with heretofore designed press fit acetabular cups relates to the configuration of the outer shell. In particular, in an attempt to increase retaining forces, a number of acetabular cups have been designed with a flared rim (known as dual radius or "bubble" cups) or a frusto-conically shaped annular rim portion (known as dual-geometry cups). Although the configuration of such cups may generate relatively strong retention forces at the rim portion of the cup, surface contact and therefore retention forces are relatively small at the portions of the outer shell other than the rim portion. Moreover, such reduced surface contact at the portions of the outer shell other than the rim portion reduces bone ingrowth in such portions.

What is needed therefore is an acetabular cup and reamer assembly and associated method which overcomes one or more of the above-mentioned drawbacks. What is particularly needed is an acetabular cup and reamer assembly and associated method which

allows for the cup to be secured to the acetabulum without the use of bone cement. What is also needed is an acetabular cup and reamer assembly and associated method which facilitates greater amounts of bone ingrowth relative to heretofore designed acetabular cups.

Summary of the Invention

In accordance with one embodiment of the present invention, there is provided a method of securing an acetabular cup to an acetabulum so as to provide a bearing surface for a head portion of a femur. The method includes the step of reaming a hemispherically-shaped cavity into the acetabulum with a reamer. The reamer includes a hemispherically-shaped cutting head. The method also includes the step of press fitting the acetabular cup into the cavity reamed into the acetabulum. The acetabular cup includes a cup body having a substantially constant radius sidewall which extends outwardly from an apex to an annular rim. The sidewall defines an imaginary hemisphere with an outer face of the annular rim defining a segmental plane which intersects the imaginary hemisphere. The segmental plane is parallel to a great circle of the imaginary hemisphere. The segmental plane is separated from the great circle of the imaginary hemisphere by a distance D in which 0.5 millimeters $\leq D \leq 2.0$ millimeters.

In accordance with another embodiment of the present invention, there is provided a prosthetic hip assembly for replacing a natural bearing

surface of an acetabulum with an artificial bearing surface adapted to cooperate with a head portion of a femur. The prosthetic hip assembly includes a hemispherically-shaped reamer adapted to ream a hemispherically-shaped cavity into the acetabulum. The reamer includes a hemispherically-shaped cutting head. The prosthetic hip assembly also includes an acetabular cup adapted to be press fit into the cavity reamed into the acetabulum. The acetabular cup includes a cup body having a substantially constant radius sidewall which extends outwardly from an apex to an annular rim. The sidewall defines an imaginary hemisphere with an outer face of the annular rim defining a segmental plane which intersects the imaginary hemisphere. The segmental plane is parallel to a great circle of the imaginary hemisphere. The segmental plane is separated from the great circle of the imaginary hemisphere by a distance D in which 0.5 millimeters $\leq D \leq$ 2.0 millimeters.

In accordance with a further embodiment of the present invention, there is provided a method of securing an acetabular cup to an acetabulum. The acetabular cup having a bearing surface adapted to receive a head portion of a femur. The method includes the step of reaming a hemispherically-shaped cavity having a first radius into the acetabulum with a reamer. The reamer includes a hemispherically-shaped cutting head which possesses the first radius. The method also includes the step of press fitting the acetabular cup into the cavity reamed into the acetabulum. The acetabular cup includes a cup body having a

substantially constant radius sidewall which extends outwardly from an apex to an annular rim. The sidewall defines an imaginary hemisphere having a second radius. The second radius is greater than the first radius. An outer face of the annular rim of the cup body defines a segmental plane which intersects the imaginary hemisphere. The segmental plane is parallel to a great circle of the imaginary hemisphere. The segmental plane is separated from the great circle of the imaginary hemisphere by a distance D in which 0.5 millimeters $\leq D \leq$ 2.0 millimeters.

In accordance with another embodiment of the present invention, there is provided a method of securing an acetabular cup to an acetabulum so as to provide a bearing surface for a head portion of a femur. The method includes the step of reaming a hemispherically-shaped cavity into the acetabulum with a reamer. The method also includes the step of press fitting the acetabular cup into the cavity reamed into the acetabulum. The acetabular cup includes a cup body having an outer rim and a sidewall which defines an imaginary hemisphere having a great circle. All points located on the sidewall are separated from a center point of the great circle by a substantially equal distance R. All points located on a peripheral edge of the outer rim are separated from the great circle of the imaginary hemisphere by a distance D in which 0.5 millimeters $\leq D \leq$ 2.0 millimeters.

In accordance with yet a further embodiment of the present invention, there is provided a prosthetic hip assembly for replacing a

natural bearing surface of an acetabulum with an artificial bearing surface adapted to cooperate with a head portion of a femur. The prosthetic hip assembly includes a hemispherically-shaped reamer adapted to ream a hemispherically-shaped cavity into the acetabulum. The prosthetic hip assembly also includes an acetabular cup adapted to be press fit into the cavity reamed into the acetabulum. The acetabular cup includes a cup body has an outer rim and a sidewall which defines an imaginary hemisphere having a great circle. All points located on the sidewall are separated from a center point of the great circle by a substantially equal distance R. All points located on a peripheral edge of the outer rim are separated from the great circle of the imaginary hemisphere by a distance D in which 0.5 millimeters $\leq D \leq$ 2.0 millimeters.

It is therefore an object of the present invention to provide a new and useful prosthetic hip assembly.

It is moreover an object of the present invention to provide an improved prosthetic hip assembly.

It is a further object of the present invention to provide a new and useful method of securing an acetabular cup to an acetabulum.

It is also an object of the present invention to provide an improved method of securing an acetabular cup to an acetabulum.

It is yet another object of the present invention to provide a method and apparatus for securing an acetabular cup to an acetabulum which does not require the use of bone cement.

It is moreover an object of the present invention to provide a method and apparatus for securing an acetabular cup to an acetabulum which facilitates greater amounts of bone ingrowth relative to heretofore designed acetabular cups.

The above and other objects, features, and advantages of the present invention will become apparent from the following description and the attached drawings.

Brief Description of the Drawings

FIG. 1 is an exploded perspective view which shows an acetabular cup and associated bearing insert which incorporate the features of the present invention therein;

FIG. 2 is an enlarged side elevational view of the acetabular cup of FIG. 1 with an imaginary true hemisphere superimposed thereon;

FIG. 3 is a perspective view of a reamer which is utilized to ream the acetabulum of a patient prior to implantation of the acetabular cup of FIG. 1;

FIG. 4 is a perspective view of the acetabulum subsequent to reaming with the reamer of FIG. 3;

FIG. 5 is a view similar to FIG. 4, but showing the acetabular cup press fit into the cavity reamed into the acetabulum by the reamer;

FIG. 6 is a diagrammatic view which shows an outline of the acetabular cup of FIG. 1 superimposed on an outline of the cavity reamed into the acetabulum by the reamer; and

FIG. 7 is a side elevational view of a prior art acetabular cup.

Detailed Description of the Invention

While the invention is susceptible to various modifications and alternative forms, a specific embodiment thereof has been shown by way of example in the drawings and will herein be described in detail. It should be understood, however, that there is no intent to limit the invention to the particular form disclosed, but on the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the invention as defined by the appended claims.

Referring now to FIG. 1, there is shown a prosthetic hip assembly 10 for use in either a partial or total hip replacement procedure. The prosthetic hip assembly 10 includes an acetabular component or cup 12 and a bearing insert 14. Collectively, the acetabular cup 12 and the bearing insert 14 provide an artificial bearing surface on which a natural or artificial head portion of a femur (not shown) may bear. In particular, as shall be discussed in greater detail, the acetabular cup 12 is implanted into a patient's acetabulum 16 (see FIGS. 4 and 5) such that the bearing insert 14 may then be positioned in an insert-receiving cavity 18 (see FIG. 1) defined in the acetabular cup 12. The bearing insert 14 is preferably

constructed from a polymeric material such as polyethylene or ultra-high molecular weight polypropylene (UHMWPE) thereby providing a desirable artificial surface on which the head portion of the femur may bear.

As shown in FIG. 1, the bearing insert 14 has a number of keying tabs 20 defined therein. The keying tabs 20 are received into a number of corresponding keying slots 22 defined in the acetabular cup 12 to prevent rotation of the bearing insert 14 relative to the acetabular cup 12 when the bearing insert 14 is positioned in the insert-receiving cavity 18 of the cup 12.

As shown in FIGS. 1 and 2, the acetabular cup 12 includes a cup body 24 which has a sidewall 26. The sidewall 26 has a textured or porous outer surface. Such a textured or porous outer surface enhances bone ingrowth thereby facilitating long-term attachment of the acetabular cup 12 to the acetabulum 16. The sidewall 26 extends outwardly at a substantially constant radius R_C from an apex or dome 28 of the body 24 to an annular rim 30. In particular, as shown in FIG. 2, an imaginary hemisphere 32 may be superimposed over the acetabular cup 12. The imaginary hemisphere 32, as with any true hemisphere, possesses an apex 34 and a great circle 36. The great circle 36 is the circle that is defined by the intersection of the surface of a sphere by a plane that passes through the center of the sphere. In essence, a sphere which is bisected along its "equator" into two equal halves forms a great circle at the plane of bisection. Hence, the center point of the bisected sphere is

the center point of the great circle of the hemisphere. Accordingly, every point along the surface of the imaginary hemisphere 32 (and hence every point on the outer surface of the sidewall 26) lies an equal distance (i.e. the radius R_C) from a center point 38 of the great circle 36 of the imaginary hemisphere 32. Indeed, substantially every point on the sidewall 26 of the cup body 24 is positioned a distance that is equal to the radius R_C away from the center point 38 of the great circle 36. It should be appreciated that the textured or porous outer surface of the sidewall 26 creates a somewhat irregular or "jagged" outer surface. Hence, as used herein, the term "sidewall", when utilized in the context of "every point on the sidewall being positioned a distance equal to the radius (i.e. R_C) away from the center point of the great circle", is intended to mean the average or mean height of the jagged outer surface of the sidewall thereby factoring out any slight fluctuations in the distance from the center point of the great circle caused by the textured or porous outer surface of the sidewall.

a2 The outer face of the annular rim 30 of the cup body 24 defines a segmental plane 40 (shown as a line in the side elevational view of FIG. 2) which intersects the imaginary hemisphere 32. The segmental plane 40 is oriented substantially parallel to the great circle 36 and is spaced apart from the great circle 36 by a relatively small distance D. Hence, every point on the outer peripheral edge of the annular rim is spaced apart from the great circle 36 by the distance D. In one exemplary embodiment,

distance D is between 0.5 and 2.0 millimeters. In a more specific embodiment, distance D is approximately 1 millimeter.

As a result, the cup body 24 of the acetabular cup 12 is configured a substantially true hemisphere. Indeed, with the exception of (1) the portion of the cup 12 near its apex 28 which is removed in order to facilitate a threaded aperture 42 which is utilized during implantation of the cup 12, and (2) the portion of the sidewall 26 which would be present if the sidewall 26 was extended the distance D toward the great circle 32 of the imaginary hemisphere 32, the cup body 24 is, in fact, configured as a true hemisphere. As shall be discussed below, such a configuration (i.e. that of a nearly true hemisphere) provides numerous advantages to the acetabular cup 12 relative to heretofore designed cups.

Referring now to FIG. 3, there is shown a cutting tool or reamer 50 associated with the prosthetic hip assembly 10. The reamer 50 is utilized to ream or otherwise cut the acetabulum 16 in order to form a hemispherically-shaped cavity 52 therein (see FIG. 4). The reamer 50 includes a cutting head 54 secured to a shaft 56. The cutting head 54 includes a number of cutting projections 58 which are configured to engage and remove bone material from the patient's acetabulum 16. The outer edges of the cutting projections 58 define the radius of the hemispherically-shaped cutting head 54. In one exemplary embodiment, the cutting projections 58 of the cutting head 54 define a true hemisphere.

In particular, the general profile created by the cutting projections 58 (and hence the cavity created by the reamer 50) is that of a true hemisphere.

Moreover, the radius of the cutting head 54 is preferably slightly smaller than the radius R_C of the acetabular cup 12. In one exemplary embodiment of the present invention, the radius of the cutting head 54 is between one-half (0.5) and one and one-half (1.5) millimeters smaller than the radius R_C of the acetabular cup 12. In a more specific exemplary embodiment of the present invention, the radius of the cutting head 54 is approximately one (1) millimeter smaller than the radius R_C of the acetabular cup 12. For example, if the anatomy of a given patient requires the use of a fifty-six millimeter acetabular cup 12 (i.e. an acetabular cup having an outer diameter of 56 mm), the reamer 50 utilized to ream the patient's acetabulum 16 preferably has a cutting head diameter of fifty-four millimeters (i.e. the outer diameter of the cutting head is 54 mm). Such use of a smaller reamer 50 provides numerous advantages. For example, it has been found that such use of a slightly smaller reamer 50 creates a cavity 52 in the acetabulum 16 which provides preferable amounts of insertion resistance thereby firmly retaining the acetabular cup 12 upon press fit thereof into the cavity 52 without requiring insertion forces large enough to crack or otherwise break the acetabulum.

Hence, as shown in FIG. 4, use of the reamer 50 to ream the acetabulum produces the cavity 52 having a radius R_A. As described

above, the radius of the cutting head 54 of the reamer 50 is preferably slightly smaller than the radius R_C of the acetabular cup 12. Hence, the radius R_A reamed into the cavity 52 of the acetabulum 16 is likewise slightly smaller than the radius R_C of the acetabular cup 12. Such a slight difference in radius size provides for enhanced implantation properties. In particular, as alluded to above, the acetabular cup 12 is configured to be press fit into the reamed cavity 52 of the acetabulum 16 without the use of bone cement. As such, the nearly true hemispheric shape of the acetabular cup 12 provides for constant contact with the reamed hemispherically-shaped cavity 52 of the acetabulum 16 along the entire outer surface of the cup body 24.

Moreover, the presence of a slightly smaller radius R_A of the cavity 52 also causes a need for a slight increase in the insertion force (i.e. the press fit) as the cup 12 is implanted in the direction from the dome 28 to the annular rim 30. This slightly increased resistance enhances the retention of the cup 12 when it is press fit into the acetabulum 16. In addition, since the cavity 52 is reamed, for example, two (2) millimeters smaller in diameter relative to the acetabular cup 12 (i.e. R_A is 2 mm smaller than R_C), an approximately one millimeter difference is created on each "side" of the annular rim 30. Indeed, as shown in FIG. 6, a "graduated" or slightly increasing press fit is created as the acetabular cup 12 is implanted into the acetabulum 16. Specifically, line-to-line contact exists between the cup 12 and the cavity 52 in the area near the dome 28

of the cup 12. Hence, the press fit of the cup 12 into the cavity 52 gradually increases from approximately zero in the areas of such line-to-line contact (i.e. the dome 28) to a press fit that equals a distance P on each "side" of the cup 12 at the annular rim 30. In the exemplary embodiment described in FIG. 6, the distance P is one millimeter (1 mm) thereby creating an overall press fit of two millimeters (2 mm) at the annular rim 30 of the cup 12. This increasing press fit provides for a reliable (i.e. stable) press fit of the acetabular cup 12 into the reamed cavity 52 thereby further enhancing the retention of the cup 12 in the reamed cavity 52.

Moreover, as described above, since both the reamed cavity 52 and the acetabular cup 12 are configured as nearly true hemispheres having similar sizes, the outer surface of the sidewall 26 of the cup 12 contacts the reamed hemispherically-shaped cavity 52 of the acetabulum 16 along substantially all of the surface of the cavity 52. Hence, the outer porous surface of the sidewall 26 of the acetabular cup 12 "scratches" or otherwise slightly abrades substantially all of the wall surface of the cavity 52 as the cup 12 is press fit into the cavity 52. This slight abrading facilitates bone ingrowth into the porous outer surface of the acetabular cup 12.

Operation of the Present Invention

In operation, the prosthetic hip assembly 10 of the present invention is utilized in the performance of either a total or partial hip replacement procedure in order to provide an artificial bearing surface for either a natural or artificial head portion of the femur without the use of bone cement. As shown in FIG. 4, the reamer 50 is first utilized to ream or otherwise cut the acetabulum 16 in order to form the hemispherically-shaped cavity 52 therein. In particular, the surgeon rotates the reamer 50 such that the cutting projections 58 of the cutting head 54 engage and remove bone material from the patient's acetabulum 16. As described above, the radius of the cutting head 54 is preferably slightly smaller than the radius R_C of the acetabular cup 12. For example, the reamer 50 utilized by the surgeon generally has a cutting radius which is approximately one (1) millimeter smaller than the radius R_C of the acetabular cup 12 that is to be implanted. For example, if the anatomy of the patient requires the use of a fifty-six millimeter acetabular cup 12 (i.e. an acetabular cup having an outer diameter of 56 mm), the reamer 50 utilized to ream the patient's acetabulum 16 preferably has a cutting head diameter of fifty-four millimeters (i.e. the outer diameter of the cutting head is 54 mm).

Hence, as shown in FIG. 4, once the surgeon has utilized the reamer 50 to ream the acetabulum 16, the hemispherically-shaped cavity 52 (having a radius R_A) is formed. Thereafter, the surgeon implants the

acetabular cup 12 into the reamed acetabulum 16. In particular, the acetabular cup 12 is press fit into the reamed cavity 52 of the acetabulum 16 by the surgeon without the use of bone cement. During such press fitting, the true hemispherical shape of the acetabular cup 12 provides for constant contact with the reamed hemispherically-shaped cavity 52 of the acetabulum 16 along the entire outer surface of the cup body 24. Moreover, the presence of a slightly smaller radius R_A of the cavity 52 also causes a need for a slight increase in the insertion force as the cup 12 is implanted in the direction from the dome 28 to the annular rim 30. This increases the retention of the cup 12 when it is press fit into the acetabulum 16.

Moreover, since the cavity 52 is reamed, for example, two (2) millimeters smaller in diameter relative to the acetabular cup 12 (i.e. R_A is 2 mm smaller than R_C), an approximately one millimeter difference is created on each "side" of the annular rim 30. This slight difference provides for a reliable (i.e. stable) press fit of the acetabular cup 12 into the reamed cavity 52.

In addition, during press fitting of the acetabular cup 12 into the reamed cavity 52, the outer porous surface of the sidewall 26 of the acetabular cup 12 "scratches" or otherwise slightly abrades substantially all of the wall surface of the cavity 52. As described above, this slight abrading facilitates bone ingrowth into the porous outer surface of the acetabular cup 12. Moreover, the similar configuration and size of the

acetabular cup 12 and reamed cavity 52 allows the cup 12 to be fully seated into a position in which the annular rim 30 is substantially flush mounted with the distal surface of the acetabulum 16 (see FIG. 5) without requiring significant amounts of "estimating" by the surgeon during reaming of the bone.

Once the acetabular cup has been press fit into the cavity 52 defined in the acetabulum 16, the bearing insert 14 is installed. In particular, the bearing insert 14 may then be positioned in the insert-receiving cavity 18 (see FIG. 1) defined in the acetabular cup 12. As described above, the keying tabs 20 of the bearing insert 14 are received into the corresponding keying slots 22 defined in the acetabular cup 12 to prevent rotation of the bearing insert 14 relative to the acetabular cup 12. Once installed in such a manner, the bearing insert 14 provides a desirable artificial surface on which the artificial or natural head portion of the femur may bear.

Hence, as described herein, the prosthetic hip assembly 10 of the present invention provides numerous advantages over heretofore designed assemblies. For example, the prosthetic hip assembly 10 of the present invention may be utilized to secure the acetabular cup to the acetabulum without the use of bone cement. Moreover, use of a constant radius, nearly true hemispherically-shaped acetabular cup provides for enhanced performance characteristics such as resistance to loosening and instability since the configuration of the cup distributes loads more

evenly across the entire outer surface of the cup relative to heretofore designed dual-geometry or bubble cups. In addition, the use of a constant radius cup prevents the development of gaps near the flared outer rim surfaces of heretofore designed dual-geometry or bubble cups. It is known that the presence of such gaps not only prevents bone ingrowth, but also undesirably facilitates the formation of lysis in the bone positioned near the rim of the cup.

In addition, since both the reamer 50 and the acetabular cup 12 are configured as nearly true hemispheres having similar sizes, the surgeon is not required to estimate the approximate depth as to when the acetabulum has been reamed deeply enough. This is a significant improvement over the use of heretofore designed sub-hemispherical cups in which the surgeon must do such estimating.

Moreover, since both the reamer (and hence the reamed cavity 52) and the acetabular cup 12 are configured as nearly true hemispheres having similar sizes, the outer surface of the sidewall 26 of the cup 12 contacts the reamed hemispherically-shaped cavity 52 of the acetabulum 16 along substantially all of the surface of the cavity 52. As described above, this feature causes the outer porous surface of the sidewall 26 of the acetabular cup 12 to "scratch" or otherwise slightly abrade substantially all of the wall surface of the cavity 52 as the cup 12 is press fit into the cavity 52. Such slight abrading advantageously facilitates bone ingrowth into the porous outer surface of the acetabular cup 12.

Further, the similar configuration and size of the acetabular cup 12 and the reamed cavity 52 also allows the cup 12 to be fully seated into a position in which the annular rim 30 is substantially flush with the distal surface of the acetabulum 16 (see FIG. 5) without requiring significant amounts of "estimating" by the surgeon during reaming of the bone.

Moreover, use of a reamer which is slightly smaller than the acetabular cup provides preferable amounts of resistance thereby firmly retaining the acetabular cup upon press fit thereof into the cavity without requiring insertion forces large enough to crack or otherwise break the acetabulum.

While the invention has been illustrated and described in detail in the drawings and foregoing description, such an illustration and description is to be considered as exemplary and not restrictive in character, it being understood that only the preferred embodiment has been shown and described and that all changes and modifications that come within the spirit of the invention are desired to be protected.

There are a plurality of advantages of the present invention arising from the various features of the prosthetic hip assembly and associated method described herein. It will be noted that alternative embodiments of the prosthetic hip assembly and associated method of the present invention may not include all of the features described yet still benefit from at least some of the advantages of such features. Those of ordinary skill in the art may readily devise their own implementations of a prosthetic hip

assembly and associated method that incorporate one or more of the features of the present invention and fall within the spirit and scope of the present invention as defined by the appended claims.